

CLAIMS

What is claimed is:

1. A polishing pad comprising:
a first member comprising a structurally degradable
5 abrasive first material; and,
a second member comprising a second material that is
less degradable and less abrasive than said first material.
2. The pad of claim 1, wherein said first member
10 includes a portion that extends beyond said second member.
3. The pad of claim 1, wherein:
said first member includes a first polishing surface;
and,
15 said second member includes a second polishing surface
that with said first polishing surface define a polishing
face.
4. The pad of claim 1, wherein:
20 said first member includes a plurality of first sections
having first polishing surfaces; and,
said second member includes a plurality of second
sections having second polishing surfaces that with said
first polishing surfaces define a polishing face.
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5. The pad of claim 4, wherein said plurality of first
and second sections are provided in an alternating
arrangement.
6. The pad of claim 1, wherein:
30 said second material is more soluble in a solvent than
said first material.

7. The pad of claim 6, wherein:
said second material comprises an acrylate polymer; and,
said first material comprises a urethane material
containing discrete abrasive particles ranging from 15 nm -
5 1000 nm in size and selected from the group consisting of
SiO₂, CeO₂, Al₂O₃, Ta₂O₅, and MnO₂.

8. The pad of claim 1, wherein said first material
comprises a matrix material containing discrete particles
10 that are more abrasive than said matrix.

9. The pad of claim 8, wherein said discrete particles
are selected from the group consisting of SiO₂, CeO₂, Al₂O₃,
Ta₂O₅, and MnO₂.

15 10. The pad of claim 8, wherein said matrix material is
substantially nonabrasive.

11. The pad of claim 8, wherein said matrix material is
20 abrasive.

12. The pad of claim 1, wherein said second material is
substantially nonabrasive.

25 13. The pad of claim 12, wherein said second material
is substantially nondegradable.

14. The pad of claim 1, wherein said second material is
substantially nondegradable.

30 15. The pad of claim 1, wherein said first member
comprises a chemically active material.

16. A polishing pad for use in performing chemical mechanical polishing, comprising:

5 a first member including a plurality of first sections having first polishing surfaces and comprising a first material further comprising an erodible, substantially nonabrasive matrix material containing discrete particles of abrasive material distributed therein; and,

10 a second member including a plurality of second sections having second polishing surface and comprising a second material that is less erodible and less abrasive than said first material, wherein said first and second polishing surfaces define a polishing face and said second member is removable to allow a portion of said first member containing said first polishing surface to extend beyond said second
15 polishing surface.

17. The pad of claim 16, wherein said first and second members are formed with said first polishing surface extending beyond said second polishing surface.
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18. The pad of claim 16, wherein said second material comprises a soluble acrylate polymer.

19. The pad of claim 18, wherein said soluble acrylate
25 polymer is soluble in HCl/H₂O solutions.

20. The pad of claim 18, wherein said soluble acrylate polymer is soluble in a solvent selected from the group consisting of acetone and isopropyl alcohol.
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21. The pad of claim 18, wherein said soluble acrylate polymer comprises polymethylmethacrylate.

22. The pad of claim 16, wherein said first material comprises a material selected from the group consisting of urethanes and polyphenyl oxide, and containing discrete abrasive particles ranging from 15 nm - 1000 nm in size and
5 selected from the group consisting of SiO₂, CeO₂, Al₂O₃, Ta₂O₅, and MnO₂.

23. An apparatus for performing mechanical polishing of a semiconductor wafer surface, comprising:
10 a polishing pad having a polishing face, wherein said polishing pad further comprises,
a first member having a first polishing surface and comprising a structurally degradable abrasive first material, and,
15 a second member having a second polishing surface and comprising a second material that is less degradable and less abrasive than said first material, wherein said first and second polishing surfaces define said polishing face;
20 a wafer support having a support surface, said wafer support being disposed opposite to said pad, such that said polishing face and said support surface are substantially parallel and can be brought within close proximity; and,
a motor connected to provide relative motion between
25 said polishing face and said support surface.

24. The apparatus of claim 23, wherein said first member includes a portion including said first polishing surface that extends beyond said second polishing surface.
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25 The apparatus of claim 23, wherein said motor includes,
a support motor to impart motion to said support, and,
a platen motor to impart motion to said pad.
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26. The apparatus of claim 23, further comprising a source positioned to dispense liquid from said liquid source between said polishing face and said support surface.

5 27. The apparatus of claim 23, wherein said source is positioned to dispense liquid through said pad.

28. A method of limiting mechanical abrasion of a surface during polishing, said method comprising:

10 providing a polishing pad including a first member comprising a first material that is abrasive to a wafer surface and structurally degradable during polishing;
 incorporating a second member in the polishing pad comprising a second material that is less degradable and less
15 abrasive than the first material to limit the amount of the first member available to abrade the surface; and,
 polishing the wafer surface with the first member.

29. The method of claim 28, further comprising removing
20 a portion of the second member to expose an amount of the first member effective to polish the surface.

30. The method of claim 29, wherein:
 said incorporating further comprises incorporating a
25 second member comprising a material that is more soluble in a solvent than the first material; and,
 said removing further comprises removing a portion of the second member using the solvent.

31. A method of performing mechanical polishing of a surface, comprising:

providing a polishing pad having a first member comprising a first material that is abrasive to a surface and
5 structurally degradable during polishing that extends beyond a second member comprising a second material that is less degradable and less abrasive than the first material; and,
polishing the surface with the first member.

10 32. The method of claim 31, wherein said polishing further comprises polishing the surface with the first member until the second member contacts the surface.

33. The method of claim 31, further comprising
15 providing liquid on the surface during said polishing.

34. The method of claim 31, wherein said step of providing comprises:

providing a polishing pad having a first member
20 comprising an abrasive first material that is structurally degradable during polishing, and a second member comprising a second material that is less degradable and less abrasive than the first material; and,

removing a portion of the second member to expose an
25 amount of the first member effective to polish the surface.

35. The method of claim 34, wherein said removing includes chemically stripping the second member.

30 36. The method of claim 31, wherein said providing further comprises providing an erodible, abrasive first material having a matrix material containing discrete particles of abrasive material distributed throughout and a less erodible.

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37. The method of claim 36, wherein said providing a second material further comprises providing a substantially nonerodible second material.

5 38. The method of claim 37, wherein said providing a second material further comprises providing a substantially nonabrasive second material.

10 39. The method of claim 31, wherein said providing a second material further comprises providing a substantially nonabrasive second material.

40. A method of performing chemical mechanical polishing of a wafer surface, comprising:
15 providing a polishing pad having a first member comprising a first material that is abrasive to a wafer surface and erodible in polishing chemicals extending a predetermined distance beyond a second member comprising a second material that is substantially nonerodible in
20 polishing chemicals and substantially nonabrasive to a wafer surface;

dispensing the polishing chemicals onto the wafer surface; and,

25 polishing the wafer surface with the first member for a period of time sufficient to erode the first member to be substantially flush with the second member.

41. The method of claim 40, wherein said providing includes providing a first member comprising polyurethane
30 containing discrete abrasive particles ranging from 15 nm - 1000 nm in size and selected from the group consisting of SiO₂, CeO₂, Al₂O₃, Ta₂O₅, and MnO₂ and a second member comprising a soluble polyacrylate.

42. The method of claim 41, further comprising removing a portion of the second member by exposing the polyacrylate material to a HCl/H₂O solution to expose an amount of the first member effective to polish the surface.

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43. A method of forming a polishing pad having a polishing face, comprising:

providing a polishing pad having a first member comprising an abrasive first material that is structurally degradable during polishing; and,

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incorporating a second member in the polishing pad comprising a second material that is sufficiently less degradable and less abrasive than the first material to limit the amount of the first member available to abrade the surface.

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44. The method of claim 43, further comprises removing a portion of the second member to expose an amount of the first member effective to polish the surface.

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45. The method of claim 44, wherein:

said incorporating further comprises incorporating a second member comprising a material that is more soluble in a solvent than the first material; and,

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said removing further comprises removing a portion of the second member using the solvent.